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10/612,226	07/01/2003	Alan F. Jankowski	IL-11019	7754
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L.L.NL/Zilka-Kotab			LEE, CYNTHIA K	
John H. Lee, Assistant Laboratory Counsel				
Lawrence Livermore National Laboratory				
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Livermore, CA 94551			PAPER NUMBER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/612,226

Applicant(s)

JANKOWSKI ET AL.

Examiner

CYNTHIA LEE

Art Unit

1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 May 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 and 28-47 is/are pending in the application.
- 4a) Of the above claim(s) 30, 45 and 46 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13, 28, 29, 31-44 and 47 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/808)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

Response to Amendment

This Office Action is responsive to the amendment filed on 5/2/2008. Claims 1-13 and 28-47 are pending. Claims 30, 45 and 46 are withdrawn from consideration as being drawn to a non-elected invention.

The 35 USC 112,2nd rejection has been withdrawn.

Applicant's arguments have been considered. Claims 1-13, 28, 29, 31-44 and 47 are finally rejected for reasons stated herein below.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-13, 28, 29, 31-44 and 47 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The limitation "between the electrodes" in claim 1 is not supported by the disclosure as originally filed.

Applicant is required to cancel the new matter in reply to this Office Action.

Claims Analysis

The functional recitations in claims 9, 10, and 34 have been considered but was not given patentable weight because it has been held by the courts that a recitation with

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respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus if the prior art apparatus teaches all the structural limitations of the claim. Ex parte Masham, 2 USPQ2d 1647 (BdPatApp & Inter 1987). See MPEP 2115. It has been held by the courts that claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function. In re Schreiber 128 F.3d 1473, 1477-78, 44 USPQ2d 1429, 1431-32 (Fed. Cir. 1997). See MPEP 2115.

The limitation "for combining fuel and oxidant and generating heat" in claim 37 has been interpreted as intended use language. It has been considered, but was not given patentable weight. It has been held that if a prior art structure is capable of performing the intended use, then it meets the claim. See, e.g., In re Schreiber 128, F.3d 1473, 1477, 44 USPQ2d 1429, 1431 (Fed. Cir. 1997). See MPEP 2111.02.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-7, 9, 10, 12, 13, 28, 29, 31, 32, 34-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maru (US 4365007) in view of Ito (US 5227258) and Keskula (US 2004/0151955).

Maru discloses an apparatus comprising a fuel cell stack having a pair of electrodes including an anode and a cathode, and a thin film electrolyte disposed therebetween; a fuel processor 7 having a manifold positioned in fluid communication with the fuel cell stack, the manifold adapted to convey a fuel to the anode and a catalyst adapted to reform the fuel. The reform catalyst is located in the manifold and contacts the anode. See fig. 1 and 2:50-3:1-10.

Maru does not disclose the electrolyte comprising a solid oxide. However, Ito teaches of the advantages of solid oxide fuel cells (SOFCs) due to its high operating temperature, such as small polarization of expensive noble metal catalysts, high output voltage, stability and long life due to its components being solid (1:20-29). The electrolyte body can be a thin film (3:10-15). Thus, one of ordinary skill in the art at the time the invention was made using Maru's fuel cell stack would be motivated to use the fuel cell stack with solid oxide fuel cell plates for the benefit of achieving small polarization of expensive noble metal catalysts, high output voltage, stability and long life due to its components being solid, as taught by Ito.

Maru modified by Ito does not expressly disclose a manifold comprising a flow passage having at least one dimension less than 5 millimeters. However, the size of the flow passage controls the amount of reactants flowing through the fuel cell, and thus affects the amount of gas being reformed and the amount of energy generated by the fuel cell. The size of the flow passage is a result effective variable and it has been held by the courts that discovering an optimum value or workable ranges of a result-effective

variable involves only routine skill in the art, and thus not novel. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). See MPEP 2144.05.

Maru modified by Ito teaches a reformer, but does not teach a an electric heater positioned along a fuel path at a point upstream from the fuel cell stack for heating the fuel prior to the fuel reaching the fuel cell stack (Applicant's claim 1). Maru modified by Ito does not disclose a combustor thermally coupled to the fuel processor. Keskula teaches of an electric heating element 52 in the combustor and serves to vaporize the liquid fuel 46 entering the combustor 34 prior to entering the fuel processor. The combustor includes a catalyst bed [0040]. It would have been obvious to one of ordinary skill in the art at the time the invention was made to add an electric heater and a combustor along the fuel passage of Maru modified by Ito for the benefit of vaporizing the fuel prior to entering the reformer.

Claims 8 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maru (US 4365007) in view of Ito (US 5227258) and Keskula (US 2004/0151955) as applied to claim 1 above, and further in view of Carter (US 2003/0232230).

Maru modified by Ito and Keskula teaches all the elements of claim 1. Maru modified by Ito and Keskula does not teach that the electrolyte thickness is less than 10 micrometers. However, Carter teaches that thick electrolyte layer leads to relatively high electrical resistance and electrolyte thickness is about 5-20 micrometers in prior art

[0010]. Thus, it would be have been obvious to one of ordinary skill in the art at the time the invention was made to make the electrolyte thickness less than 10 micrometers for the benefit of decreasing the electrical resistance, as taught by Carter.

Maru teaches that the plate is metal (3:53).

Claim 11, 39, and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maru (US 4365007) in view of Ito (US 5227258) and Keskula (US 2004/0151955) as applied to claim 1 above, and further in view of Mallari (US 2003/0044674).

Maru modified by Ito and Keskula teaches all the elements of claim 1. Maru modified by Ito and Keskula does not teach that the manifold includes at least one wall comprising silicon. However, Mallari teaches that some of the advantages of silicon platform provides include: (1) the ability to uniformly carry a catalyst on a surface or within a bulk fluid flow-through matrix, (2), the ability when appropriately doped, to function as a current collector for the transmission of an electrical current, and (3) the ability to be selectively sculpted, metallized and processed into complicated structures via semiconductor micro-fabrication techniques [0028]. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the manifold comprising silicon for the benefit of easy manufacturing the fuel cell apparatus on a microscale.

Claim 42 is rejected under 35 U.S.C. 103(a) as being unpatentable over Maru (US 4365007) in view of Ito (US 5227258) and Keskula (US 2004/0151955) as applied to claim 1 above, and further in view of Sederquist (US 2003/0003332).

Maru modified by Ito and Keskula teaches all the elements of claim 1 and are incorporated herein. Maru modified by Ito and Keskula teaches a catalyst (8 in Fig. 1 in Maru), but does not teach the catalyst as PtRu. Maru teaches a fuel reforming catalyst as Ni, NiCr, NiCo, and Ni-Mo. Sederquist teaches a fuel processor comprising a selective oxidizer catalyst composition and noble metal reforming catalyst compositions, such as Pt/Ru as catalyst [0045]. It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute Maru's catalyst for Sederquist's Pt/Ru as catalyst in the fuel processor of Maru modified by Ito and Keskula because it has been held by the court that the selection of a known material based on its suitability for its intended use is *prima facie* obvious. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). See MPEP 2144.07.

Claims 1 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Holladay (US 7077643) in view of Ito (US 5227258)

Holladay discloses a microreformer 106 and a microcombustor 104 connected to a fuel cell (not shown) (10:36). The microreformer has a manifold 128. See fig. 1. The Examiner notes that a fuel cell necessarily has a pair of electrodes including an anode and a cathode, and an electrolyte disposed therebetween. The fuel processor

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comprises a catalyst 136. See fig. 1. The combustor is disposed on the microreformer (applicant's claim 33).

Holladay does not disclose the electrolyte comprising a solid oxide. However, Ito teaches of the advantages of solid oxide fuel cells (SOFCs) due to its high operating temperature, such as small polarization of expensive noble metal catalysts, high output voltage, stability and long life due to its components being solid (1:20-29). The electrolyte body can be a thin film (3:10-15). Thus, one of ordinary skill in the art at the time the invention was made using Holladay's fuel cell stack would be motivated to use the fuel cell stack with solid oxide fuel cell plates for the benefit of achieving small polarization of expensive noble metal catalysts, high output voltage, stability and long life due to its components being solid, as taught by Ito.

Holladay discloses a fuel cell and a manifold with a fuel processor, but does not disclose that a manifold is disclosed on the fuel cell stack. It would have been obvious to one of ordinary skill in the art at the time the invention was made to vary the configuration of the fuel cell system by disposing the microreformer on the fuel cell stack for the benefit of providing a compact connection between the fuel gas supply and the fuel cell.

Holladay modified by Ito teaches a fuel processor, but does not teach an electric heater positioned along a fuel path at a point upstream from the fuel cell stack for heating the fuel prior to the fuel reaching the fuel cell stack (Applicant's claim 1). Keskula teaches of an electric heating element 52 in the combustor and serves to vaporize the liquid fuel 46 entering the combustor 34 prior to entering the fuel processor

[0040]. It would have been obvious to one of ordinary skill in the art at the time the invention was made to add an electric heater and a combustor along the fuel passage of Holladay modified by Ito for the benefit of vaporizing the fuel prior to entering the fuel processor.

Claims 43 and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maru (US 4365007) in view of Ito (US 5227258) and Keskula (US 2004/0151955) as applied to claim 1 above, and further in view of Shioya (US 6777118).

Maru modified by Ito and Keskula teaches all the elements of claim 1 and are incorporated herein. Maru modified by Ito and Keskula teaches an electric heater, but does not teach that the heater is a thin film heater. Shioya teaches of using a thin film heater 206 in a reformer to vaporize the fuel (103:1-40). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a thin film heater instead of an electric heater because it has been held by the court that the selection of a known material based on its suitability for its intended use is *prima facie* obvious. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). See MPEP 2144.07.

Response to Arguments

Applicant's arguments filed 1/17/2008 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cynthia Lee whose telephone number is 571-272-8699. The examiner can normally be reached on Monday-Friday 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Cynthia Lee/
Examiner, Art Unit 1795

/PATRICK RYAN/
Supervisory Patent Examiner, Art
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ckl

Cynthia Lee

Patent Examiner